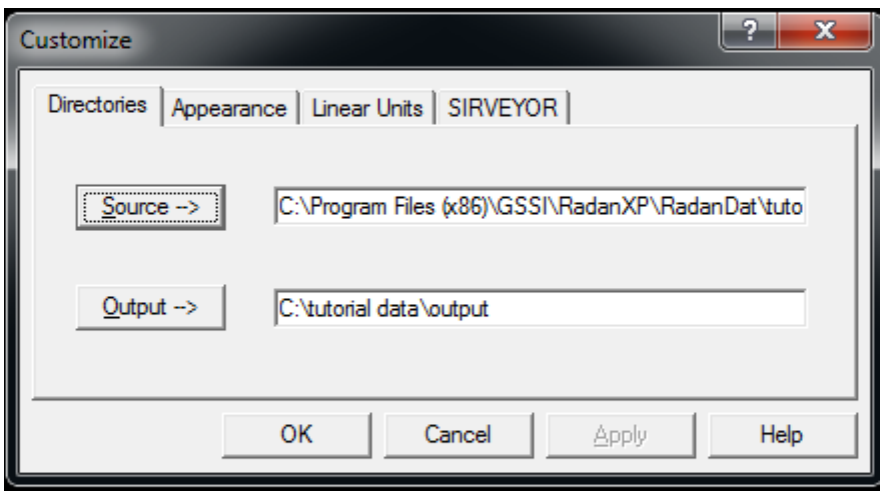
BASIC PROCESSING TUTORIALS

These tutorials are designed to familiarize you with basic process functions available in RADAN. They are not exhaustive and are meant to get you started working with the software. The data examples for the tutorials can be found included in you RADAN CD.

Sample Data File Used: TestPit.DZT, Excavation1.DZT

Topic 1: Changing the RADAN Working Directories

1. Double-click the RADAN program shortcut from your desktop to start the RADAN program
2. Choose View > Customize. Note that this option will only be active if there are no data files open. A small window will appear with four tabs: Directories, Appearance, Linear Units, and SIRVEYOR



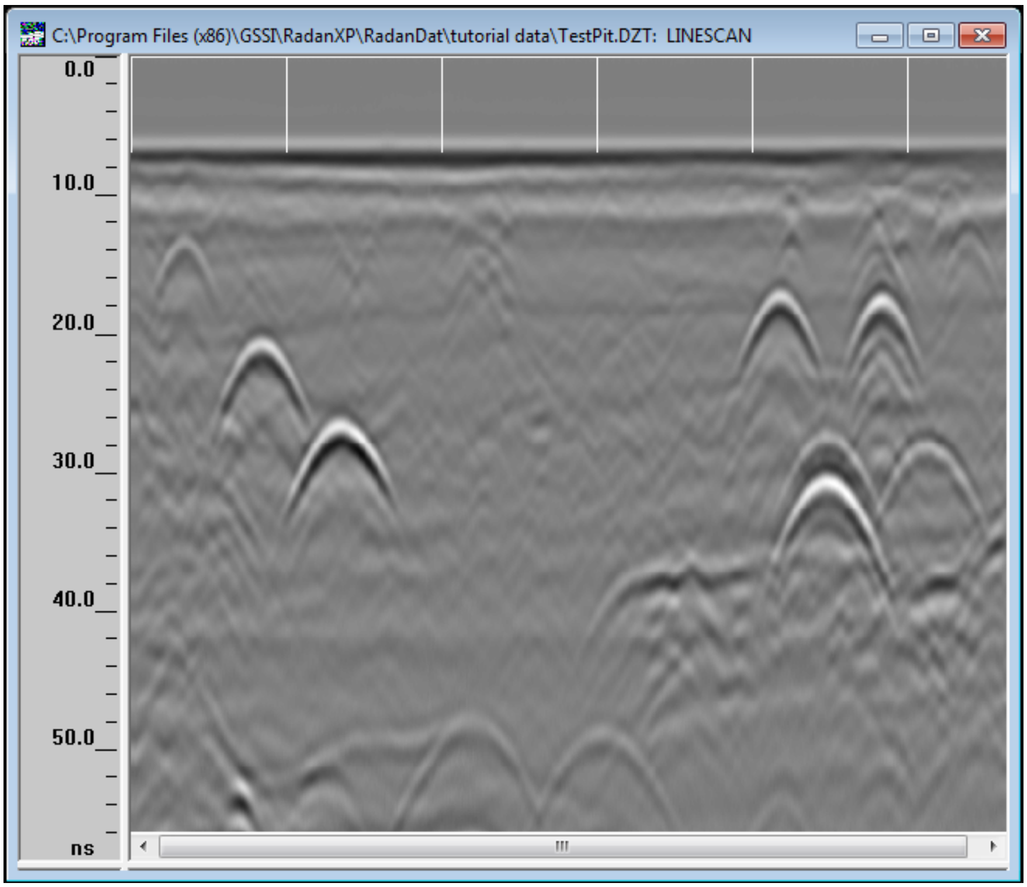
3. Click the button for Source to bring up a browser window and navigate to the folder where your data is located. You can also specify an output folder by clicking the button for Output and navigating to that location. The option for output is provided if you wish RADAN to save processed data to a different location than the raw data
4. Click the tab for Linear Units and select the Units that you wish to use. This example was collected with metric units. This data was collected without a GPS, but if you have GPS data, you can choose to display the coordinates as Lat/Long or UTM values

5. The Appearance tab controls the look and feel of RADAN. Changes you make here control the display size of the icons as well as sound signals that RADAN will make when it finish processing functions.
6. The SIRVEYOR tab is a GPS control interface for the SIR-20 control unit. It is not used in post-processing

Topic 2: Loading a Data File into RADAN

There are two ways to load a DZT file into the RADAN software

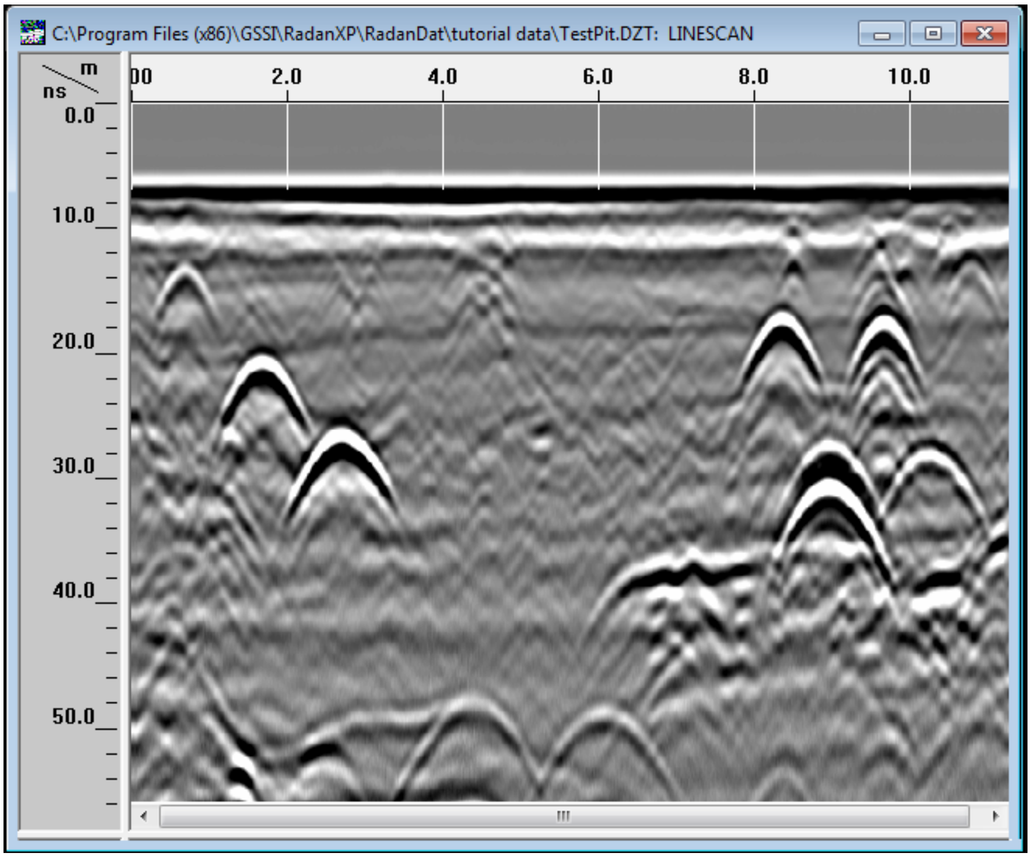
1. From RADAN, choose File > Open. RADAN will default to the Source folder that you specified in View > Customize. RADAN will also default to the DZT file type. Click on TestPit.DZT and then click Open



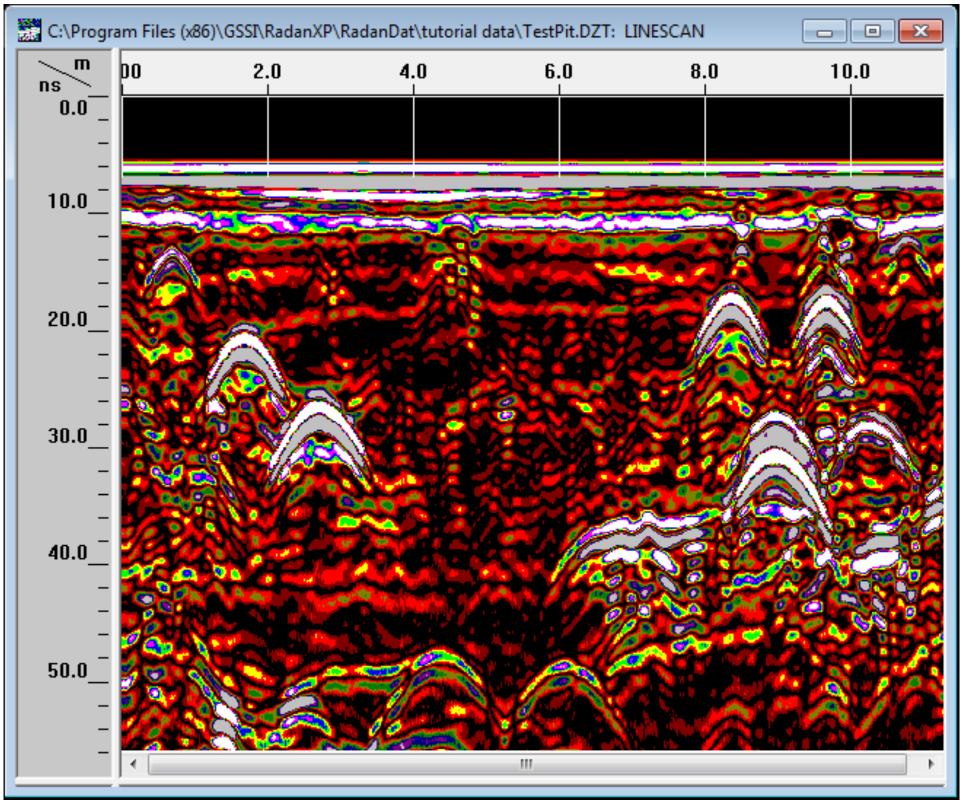
2. You can also drag a data file into the RADAN software from an open Windows browser window. For this method to work, RADAN must be open and the file that you drag must be a DZT file

Topic 3: Changing Display Parameters

1. Open TestPit.DZT. Initial gain setting may be weak, so right click on the data and choose display gain from the pop-up menu. Select 4.
2. Right-click on the vertical scale at the left side of the data window and select Show Scale from the Horizontal Scale portion of the window. RADAN will display a distance scale across the top of the data window



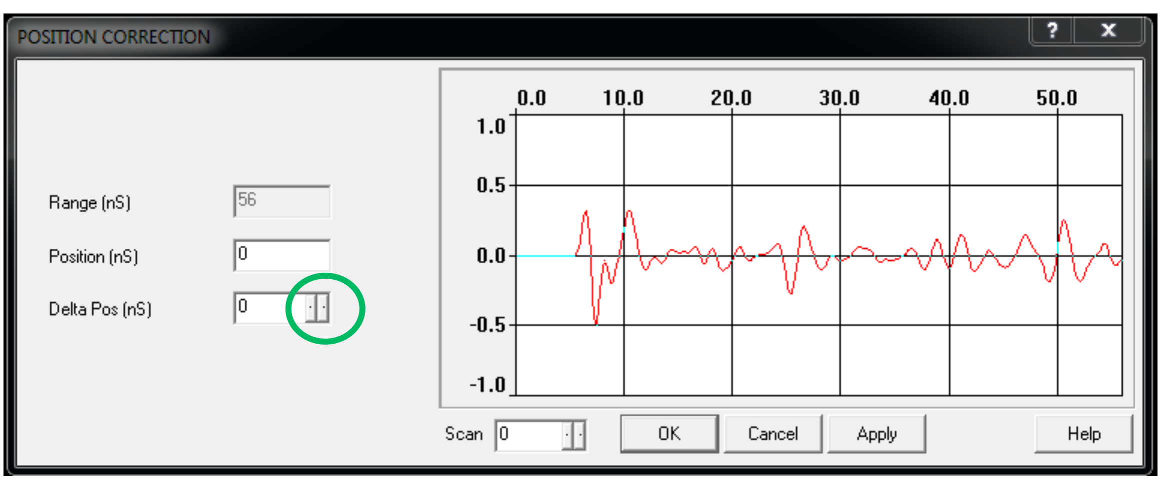
3. Right-click on the vertical scale again and select Color Table from the section at the bottom of the pop-up window. Choose Color Table 1. Right-click on the vertical scale again and select Color XForm. Select Color XForm1



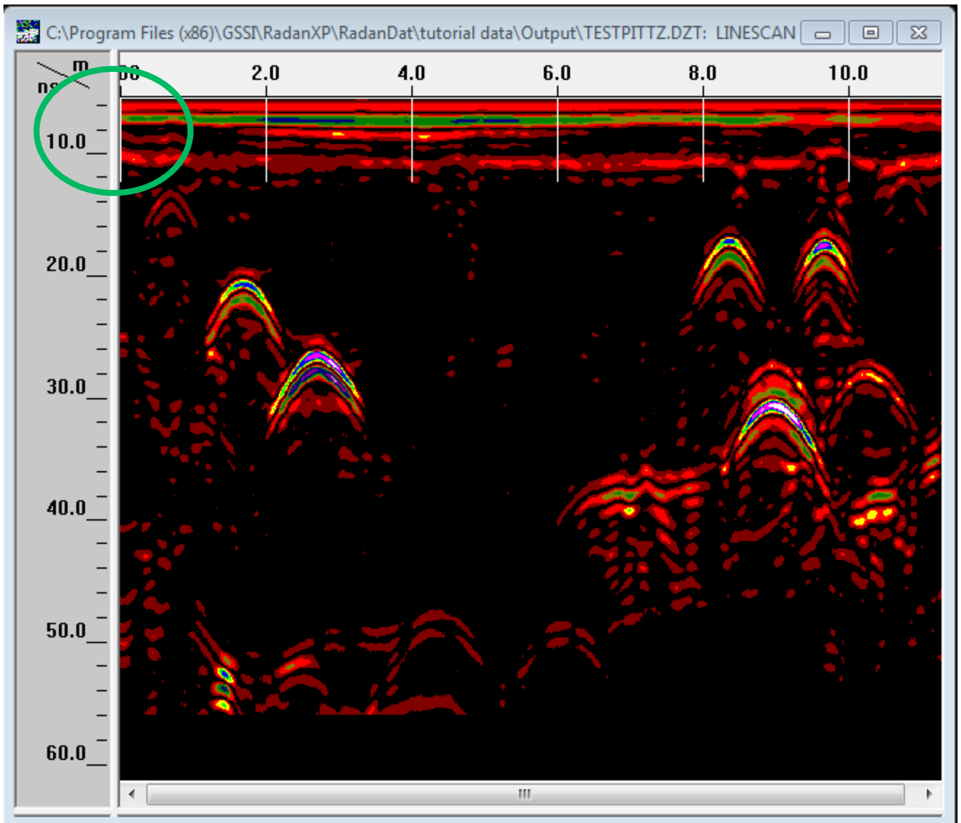
Topic 4: Performing a Position Correction

This topic covers Position Correction (sometimes called Time-Zero Correction). Position correction is used to remove the section of data that occurs before the direct wave. This topic will use TestPit.DZT

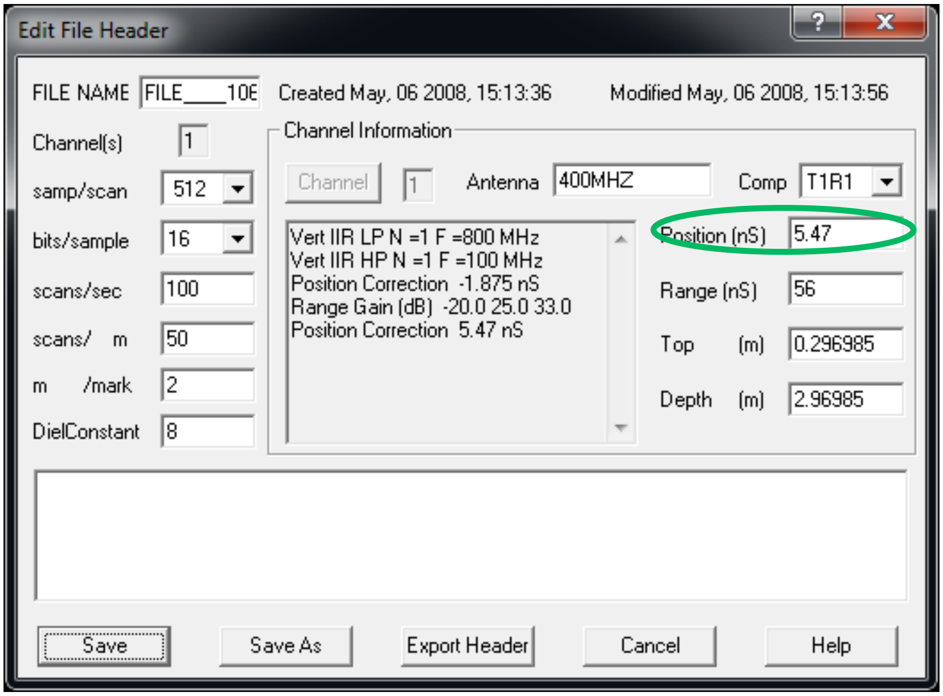
1. With the data file open, choose Process > Correct Position. The window shown below will appear on the screen. The scan is displayed tipped on its side with zero at the loft of the horizontal scale and a 1 to -1 amplitude scale on the vertical

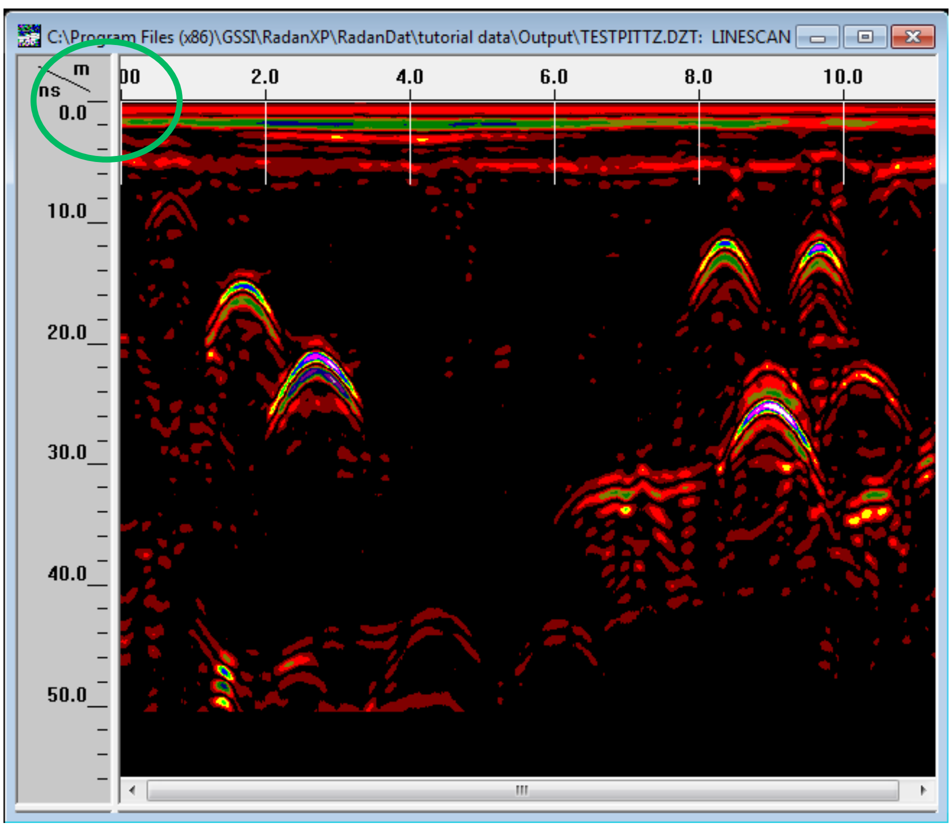


2. On the Delta Pos (ns) option (green circle) use the small buttons to cause the scan to ship to the left until the maximum of the first positive peak is as the left edge. The model scan is Scan 0 which is the first one in the profile. If this scan is not representative, click on the small buttons next to the scan window to select a more appropriate model **Note:** There is some discussion in the GPR industry as to the proper position of time zero. For the sake of consistency, GSSI recognizes the first maximum as the correct point.
3. Click OK to run the process and save the data file with a unique name. The filename TESTPITTZ.DZT is used in this example. Green circle indicates the change of position.



4. Notice that the vertical scale on the processed file no longer begins with zero. Choose Edit > File Header and reset the position to zero. Then click Save.


Edit File Header
FILE NAME FILE____10E
Created May, 06 2008, 15:13:36
Modified May, 06 2008, 15:13:56
Channel(s) 1
samp/scan 512
bits/sample 16
scans/sec 100
scans/ m 50
m /mark 2
DielConstant 8
Channel Information
Channel 1
Antenna 400MHZ
Comp T1R1
Vert IIR LP N =1 F =800 MHz
Vert IIR HP N =1 F =100 MHz
Position Correction -1.875 nS
Range Gain (dB) -20.0 25.0 33.0
Position Correction 5.47 nS
Position (nS) 5.47
Range (nS) 56
Top (m) 0.296985
Depth (m) 2.96985
Save
Save As
Export Header
Cancel
Help


C:\Program Files (x86)\GSSI\RadanXP\RadanDat\tutorial data\Output\TESTPITTZ.DZT: LINESCAN
m
ns
0.0
10.0
20.0
30.0
40.0
50.0
00
2.0
4.0
6.0
8.0
10.0

Topic 5: Background Removal

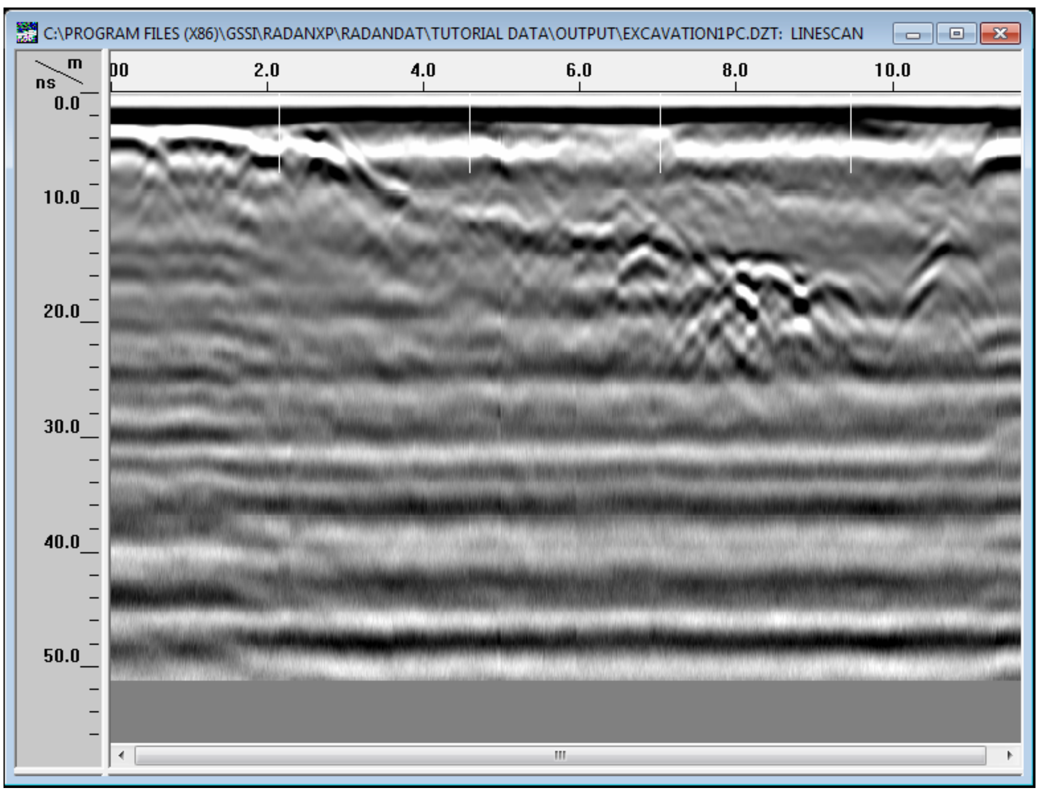
Background Removal is a horizontal high pass filter that is meant to removal constant horizontal banding in the data. This horizontal banding is usually the result of a poor signal to noise ration that can stem from nearby metal or surveying over conductive conditions. Since it is constant in the data, it is easy to remove.

A background removal is a scan length filter. It will average together a number of scans and subtract the averaged value at each sample from all scans. For normal situations, it is best to set this filter very long. For example, if your collection scans/meter was 50 and you set your filter length to 49, then you will remove all horizontal features 1 meter long (or longer).

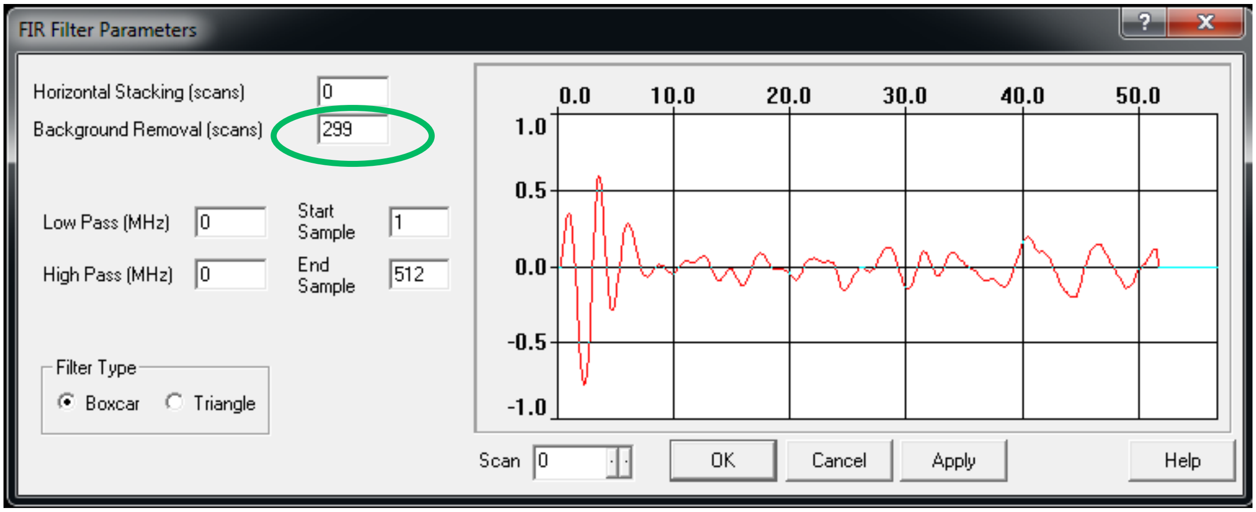
This filter will also remove the direct wave, so position correction should be done first.

For this topic, we will use file Excavation1.DZT

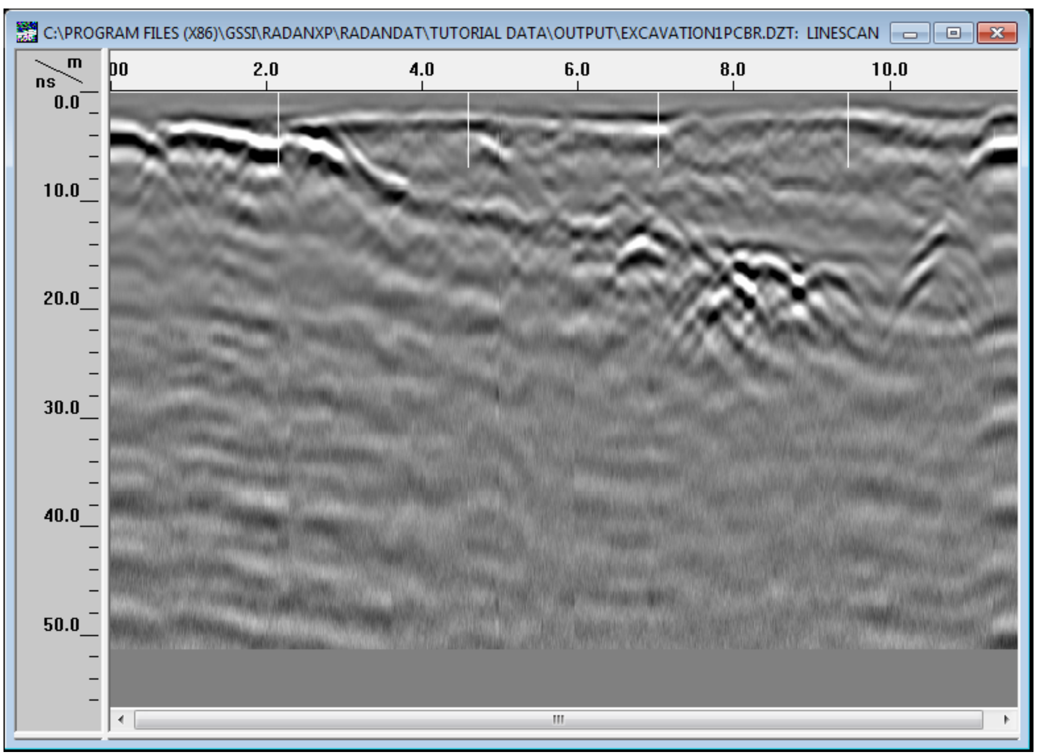
1. Open Excavation1.DZT and perform a position correction on the file. Save it as Excavation1pc.DZT



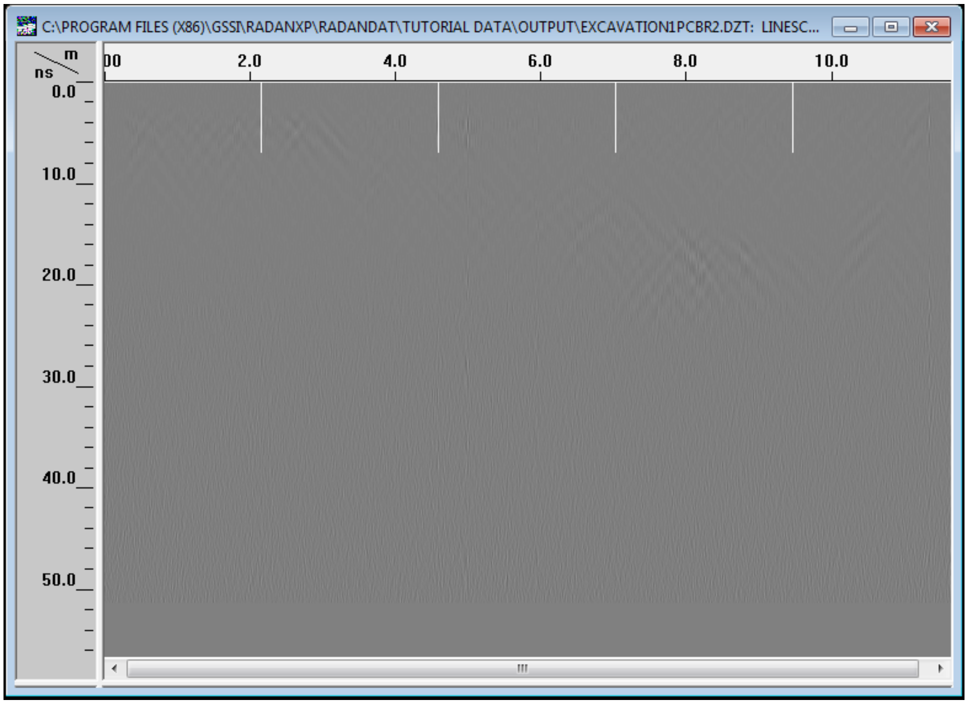
2. Choose Process > FIR Filter. While the FIR filter can perform a number of different processes, this tutorial will only use the background removal.



3. Excavation1.DZT was collected in English units. The scans/meter is approximately 60. In the window next to background removal, enter 299. You will need in 299 instead of 300 because the value entered need to be negative. A value of 299 means that the filter will remove horizontal features 5 meters in length or longer. Click OK and then save the file as Excavation1pcbr.DZT



4. Now go back to Excavation1pc.DZT and choose Process > FIR Filter again. This time use a value of 3 scans in background removal. Click OK and save the data as Excavation1pcbr2.DZT. Notice that much of the data are gone. This is an example of improper settings



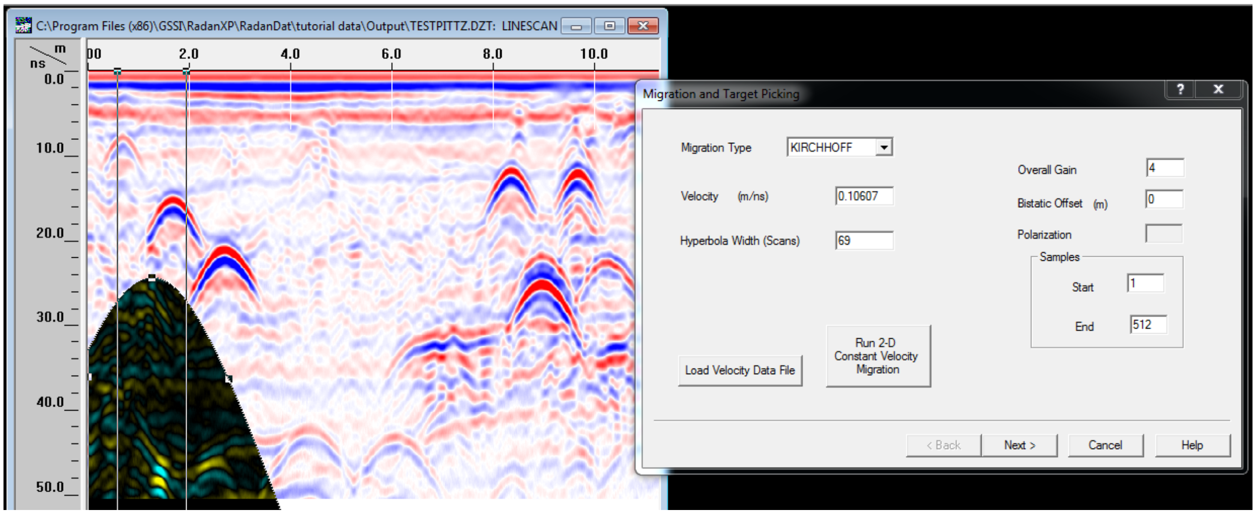
5. You can also choose to enter in an extremely large number. A window will then pop up and note the maximum possible filter length. This will be either 1023 or the total number of scans in the profiler, whichever is smaller.

Topic 6: Constant Velocity Migration

Migration is a filter designed to remove the dipping tails from hyperbolas and give a clearer image of the target's location and total reflection amplitude. It is necessary step for 3D surveys in which the goal of the survey is to locate linear objects such as pipes or rebar. Constant velocity migration also provides a dielectric value and can thus be useful for estimating depth to target in a homogenous matrix.

Since a successful migration requires a time zero position correction to be performed, we will use the output of Topic 4. Open the file TESTPITTZ.DZT

1. Choose Process > Migration. You will see the migration window pop up and a hyperbolic selection tool will be superimposed on the data. If your color table is a grayscale, this may be difficult to see. Changing the color table to 25 will make this easier.



2. Click in the center of the selection tool and hold down the mouse button. You can now drag the selection tool to cover up one of the hyperbolas in the data
3. Use the small, square handles along the edges of the selection tool to reshape the toll to match the shape of the data hyperbola as closely as possible. This is changing the velocity shown in the migration window
4. Click on the handle at the top of one of the vertical line and drag the lines so that they are approximately 90% down the tails of the data hyperbola
5. Click Run 2D Constant Velocity Migration and save the file with a unique name. For this tutorial we will use TESTPITTZM.DZT. If the hyperbolas collapse to small points, then the migration velocity was correct. If hyperbolas remain or if they have become inverted, then the velocity is incorrect.